1154-65-1051 **Shawn W. Walker*** (walker@math.lsu.edu), **Juan-Pablo Borthagaray** (jpb@umd.edu) and **Ricardo H. Nochetto** (rhn@math.umd.edu). *The Uniaxially Constrained* $\mathbf{Q}$*-tensor Model for Nematic Liquid Crystals.*

We consider the one-constant Landau-de Gennes model for nematic liquid crystals, with traceless tensor field $\mathbf{Q}$ as the order parameter. We constrain $\mathbf{Q}$ to be uniaxial: $\mathbf{Q} = s(\mathbf{n}\otimes\mathbf{n} - (1/3)\mathbf{I})$ where $\mathbf{n}$ is a director field and s is the scalar degree of orientation. Building on similarities with the one-constant Ericksen energy, we propose a structure-preserving finite element method for the computation of equilibrium configurations. We prove stability and consistency of the method without regularization, and Γ-convergence of the discrete energies towards the continuous one as the mesh size goes to zero. We give an alternating direction gradient flow algorithm for the solution of the discrete problem, and we show that such a scheme decreases the energy monotonically. Finally, we illustrate the method's capabilities by presenting some numerical simulations in two and three dimensions including non-orientable line fields. (Received September 12, 2019)